CCR Number: 0023	CRITICALITY: ROUTINE	DUE 12/04/98

DISTRIBUTION SHEET
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NEW MILLENNIUM PROJECT CONFIGURATION CHANGE REQUEST

PROGRAM EO-1

CCR NO. 0023

DATE INITIATED 11/16/98

TITLE B/L WARP TO GROUND ICD-066

ORIGINATOR Terry Smith/WARP Tech Mgr

ORIGINATOR'S CHG. NO.

SPONSOR/CODE Terry Smith PHONE x0651

EFFECTIVITY

ITEM: EO-1/WARP

S / N

ITEM:

S / N

ITEM:

S / N

CHANGE CLASS

	I	II
PRELIMINARY	☐	☐
FORMAL	☐	☐

TYPE OF CHANGE

MILESTONE	☐	INTERFACE	☒	SOFTWARE	☐
DOCUMENT	☒	POWER	☐	OTHER	☐
COST ____	☐	WEIGHT	☐	____	☐

DOCUMENTS OR SOFTWARE AFFECTED

EO-1 WARP TO GROUND ICD-066

PROBLEM

The attached draft version of EO1-ICD-066, Earth Orbiter -1 (EO-1) Wide Band Advanced Recorder/Processor (WARP) to Ground Interface Control Document (ICD) requires baselining. The document contains definitions of the playback data formats between the WARP and Ground Segment. It also provides both the S-Band and X-Band data playback formats as well as an overview of the WARP commands necessary to control data acquistion, storage and playback.

PROPOSED SOLUTION

Approve the attached draft version of EO-1 ICD-66, EO-1 WARP to Ground ICD, by the EO-1 Level II Configuration Control Board (CCB). This draft issue will be formally released after CCB approval. Future changes will be initiated by submittal of Configuration Change Requests (CCRs) and Preliminary Interface Revision Notices (PIRNs) for CCB approval. This document is maintained by the EO-1 Configuration Management Office (CMO).

BOARD ACTION		APPROVAL LEVEL REQUIRED		CRITICALITY LEVEL		PROCUREMENT CHANGE ORDER CLASSIFICATION					
APPROVE	☐	LEVEL I HQS	☐	EMERGENCY	☐	ROUTINE		URGENT		EMERGENCY	☐
APPROVE WITH CHANGE	☐	LEVEL II GSFC	☒	URGENT	☐	OPTION 1	☐	OPTION 1	☐		
DISAPPROVE	☐	LEVEL III	☐	ROUTINE	☒	OPTION 2	☐	OPTION 2	☐		
WITHDRAW	☐										

COMMENTS

Withdraw CCR as the WARP to GROUND Sup Playback Control will be incorporated into the S/C TO GROUND ECO. 23.

CHAIRPERSON _____ DATE 2 Dec 98

3/28/96

EO-1 ICD-66
Draft Issue
November 16, 1998

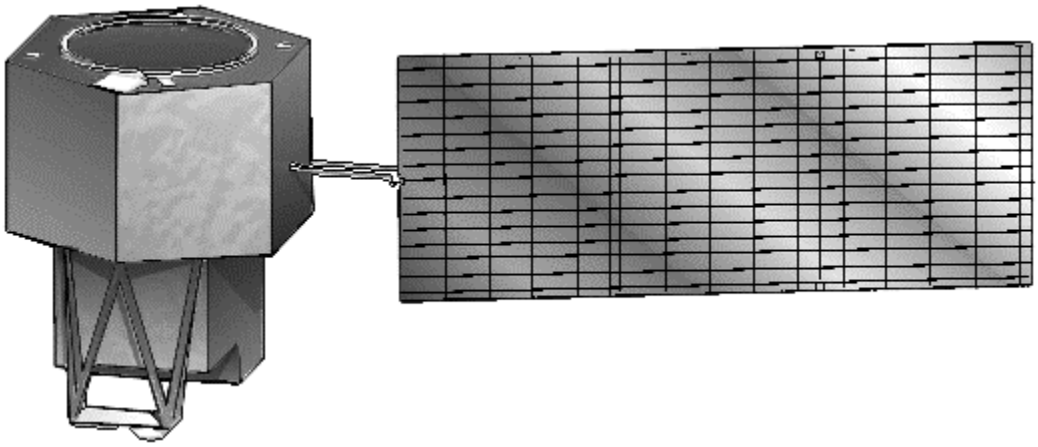
EO-1 WARP TO GROUND (ICD)

National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

EO-1 ICD-66
Draft Issue
November 16, 1998

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER



EO-1 WARP Flight Software

WARP to Ground System
Interface Control Document for Playback Control & Playback Data Formats

❖

REVISION HISTORY

Preliminary Version
01/17/97

- Initial creation.

Revision A
02/05/97

- There will be 5 seconds delay between commands.

Revision B
05/30/97

- Deleted all related information concerning science data processing and selective retransmission.
- Deleted S-Band Start and Stop Fill Frame Commands.
- Added the state transition diagram of WARP operational modes.
- Revised the Ground Commands versus Current Mode of Operation Table.
- Revised the CADU formats to reflect the 7-bit file ID in the VCDU Primary Header.
- Added the section on detail playback file format.

Revision C
07/21/97

- Merge two record commands (S/C H/K record and science data record) into one, and merge three record states into one.
- Expand all file IDs to 16-bit.
- Delete the requirement of 5 seconds delay between commands.
- Change WARP S-Band Start Playback Command to S-Band Queue File Command; and S-Band Stop Playback Command to S-Band Dequeue File Command.
- Change WARP X-Band Start Playback Command to X-Band Queue File Command; and X-Band Stop Playback Command to X-Band Dequeue File Command.
- Specify queue depth to be 63.
- Revise the MS/Pan data format.

Revision D
08/28/98

- Added new sections for S-Band fill frames and X-Band fill frames.
- Updated the MSPAN data format.
- Changed MSPAN Science Data Sync Pattern from 96 bits to 128 bits.
- Updated the Science Data Acquisition & Storage Commands section.
- Updated Commands Verses Modes of Operation table.
- Updated logical block sizes in the Playback Data Format section.
- Updated the AC data format.
- Removed End Of Science Sync Pattern from all Science Record Formats.
- Added End Of Housekeeping Data Fill Pattern to Housekeeping Data Format.
- Changed the MSPAN Science Data Sync pattern from a 72 byte fixed pattern + 24 bit counter to a 80 byte fixed pattern + 16 bit counter.
- Removed old ALI WIS and GIS Science Data Formats.
- Added new Hyperion Science Data Formats.

❖

TABLE OF CONTENTS

1 OVERVIEW

1.1 Scope

This document provides the definitions of the playback data formats between the Wide-band Advanced Recorder Processor (WARP) and the Ground Segment. The document contains both the S-Band and X-Band data playback formats as well as an overview of the WARP commands necessary to control data acquisition, storage, and playback.

1.2 References

Spec ID	Title	Source	Date
WARP582-00xx	*Recorder Management (RM) Software Specification*	GSFC 735/DSC	8/12/97
???????	*EO-1 Command & Telemetry Handbook*	GSFC 735/Litton	
	CCSDS Blue Books		
WARP735-0023	*RS-422 Terminal Board Mini Specification*		

1.3 Acronyms

AC	Atmospheric Corrector
AOS	Advanced Orbiting Systems
CADU	Channel Access Data Unit
C&DH	Command & Data Handling
CCSDS	Consultative Committee for
EO-1	Earth Observer 1 Mission
MIC	Memory Interface Controller
MIT	Massachusetts Institute Of Technology
MS	
MSSP	Medium Speed Serial Port
RM	Recorder Management
RS	Reed-Solomon
RSN	Remote Services Node
VC	Virtual Channel
VCDU	Virtual Channel Data Unit
WARP	Wide Band Advanced Recorder/Processor
XB	X-Band
XTE	X-Ray Timing Explorer

2 DATA STORAGE & PLAYBACK CONTROL

Both science and spacecraft housekeeping data are stored in the bulk memory in logical file structures. The *Recorder Management(RM) Software Specification* contains details on the file system. Each file contains data from a single spacecraft housekeeping data record session or from a single science data input channel (ie., MS/PAN) associated with a science data scene

acquisition. Hence data record and playback commands communicate to the WARP software in terms of file transactions.

The following commands can initiate the WARP to perform record and S-Band/X-Band playback operations. All commands to the WARP are first received by the C&DH from the ground for real-time distribution or for subsequent stored command processor execution. At the proper time, commands are transmitted across the spacecraft's 1773 bus for prompt execution by WARP software.

The WARP does not have the exact start and stop spacecraft times associated with a scene acquisition. This information must be derived from the science instruments' housekeeping telemetry recorded during science data acquisition (check with MIT folks).

2.1 Science Data Acquisition & Storage Commands

The following commands, in the sequence given here, are required to initiate a **Science Data Record** operation:

[1] Start Record Command

Upon receiving this command, the WARP opens the files specified in the command and configures the WARP for recording. If a file id is specified for the housekeeping record then the WARP immediately starts buffering housekeeping data. Note that once a record session has started no other files can be opened or closed until a stop record command has been received.

[2] Start Instrument Data

Once the WARP is configured for recording science data recording will begin when the science instrument is commanded to start outputting data to the WARP.

[3] Stop Instrument Data

When the desired data has been collected the science instrument will be commanded to stop outputting data to the WARP.

[4] Stop Record Command

When all science instruments have been stopped and the record session is finished a stop record command will fill out partial logical blocks, record the housekeeping data into bulk memory, and then close all the open files.

2.2 S-Band Playback Control Commands

The following command starts an **S-Band Playback** session. It is assumed that the S-Band Communications RSN has already been commanded to the proper configuration.

- **S-Band Queue File Command:**

  Upon receiving this command, the WARP queues the specified file(s) for S-Band playback. The WARP then automatically fetches data from the first file in the queue, formats this data into CADU's, and sends it out to the C&DH via the Medium Speed

Serial Port (MSSP) to the S-Band transponder. The maximum file queue depth is 64. Once all specified files in the queued are played back, the WARP terminates output operations to the MSSP, resulting in the output of fill frames by the S-Band Comm RSN hardware on Virtual Channel 63. When the WARP detects a non-empty queue again (ie., another S-Band Queue File command is received), it will once again start output data to the Communications RSN.

To de-queue a file or abort the entire S-Band playback session can be achieved by sending the following command to WARP:

- **S-Band De-queue File Command:**

  This command is used to prevent queued files from being played back or to terminate the playback of a file currently being played back over the S-Band transponder. If the specified file(s) are queued, they are de-queued. If a specified file is currently being played back, the playback data stream will switch to the next queued file, if any, at the nearest possible CADU boundary. If the specified File ID is 0xFFFF, the entire queue is emptied. If no more files are in the queue, data output on MSSP will cease, resulting in the output of fill frames by the S-Band Comm RSN.

2.3 X-Band Playback Control Commands

The following commands, in the sequence given here, are required to initiate an X-Band playback operation:

[1] Start X-Band Output Command:

When this command is received, the WARP initiates output of fill frames (Virtual Channel 63, Fill Pattern 0xEB90) to both the I and Q channels of the X-Band transponder via the Memory Interface Card (MIC). Fill frames are output continuously until either one of two conditions are met:

- receipt of a valid X-Band Queue File Command
- receipt of a Stop X-Band Output Command

The exact format of the fill frames is described in Section 3.

[2] X-Band Queue File Command:

There is a single playback queue for both X-Band channels. This command outputs a file to either queue. Once a file is in one queue, the WARP will begin to output data of the first file of that queue on that particular channel. Whenever the queue is empty, fill frames will go out on that particular channel. WARP will reject this command if the <**START X-Band Output**> command discussed previously command has not been received.

The following command dequeues a file or empties a queue from either I or Q channel:

[1] X-Band Dequeue File Command:

If the specified file is indeed in the queue, it will be deleted from the queue. If the file is currently being played back, the playback data stream of that channel will

switch to the next queued file, if any, at the nearest CADU boundary. If the specified File ID is 0xFFFF, then the entire queue will be emptied. Whenever the queue is empty, fill frames are output to both channels.

The following command terminates an X-Band playback session:

[2] Stop X-Band Fill Output Command:

This command terminates both I and Q channel output to the X-Band transponder.

2.4 Commands Verses Modes of Operation

Due to certain limitations, certain commands can only be sent when the WARP is in certain modes of operation. The following table shows the valid commands each mode of operation. “Reject” denotes that the command will be rejected and “Accept” denotes that the command is acceptable under the corresponding mode.

Ground Command	STDBY	CONFIG	SCI_REC	SB_PB	XB_PB
No Op	ACCEPT	ACCEPT	ACCEPT	ACCEPT	ACCEPT
Reset Counters	ACCEPT	ACCEPT	ACCEPT	ACCEPT	ACCEPT
Format Memory	ACCEPT	REJECT	REJECT	REJECT	REJECT
Config Masks	ACCEPT	REJECT	REJECT	REJECT	REJECT
Config Refresh Int	ACCEPT	REJECT	REJECT	REJECT	REJECT
Start H/K Record	ACCEPT	REJECT	ACCEPT	REJECT	REJECT
Stop H/K Record	NO-OP	NO-OP	NO-OP	NO-OP	NO-OP
Start Science Record	ACCEPT	REJECT	REJECT	REJECT	REJECT
Stop Science Record	NO-OP	NO-OP	ACCEPT	NO-OP	NO-OP
S-Band Q File	REJECT	REJECT	REJECT	ACCEPT	REJECT
S-Band DQ File	REJECT	REJECT	REJECT	ACCEPT	REJECT
Start XB Output	ACCEPT	REJECT	REJECT	ACCEPT	ACCEPT
Stop XB Output	NO-OP	NO-OP	NO-OP	NO-OP	ACCEPT
XB Q File	REJECT	REJECT	REJECT	REJECT	ACCEPT
XB DQ File	REJECT	REJECT	REJECT	REJECT	ACCEPT
Reset EDAC	ACCEPT	ACCEPT	ACCEPT	ACCEPT	ACCEPT
Delete File	ACCEPT	REJECT	REJECT	REJECT	REJECT
Deallocate Blocks	ACCEPT	REJECT	REJECT	REJECT	REJECT
RS422 Test Mode	ACCEPT	ACCEPT	REJECT	ACCEPT	ACCEPT

3 PLAYBACK CCSDS FRAME FORMATS

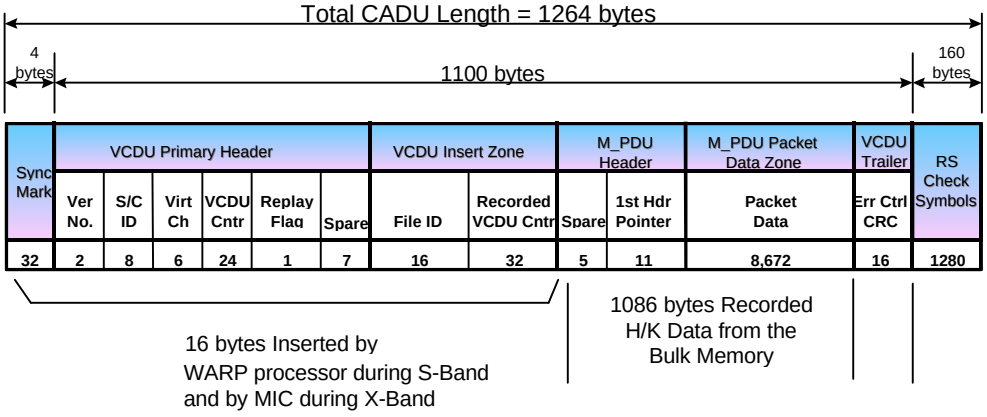
Playback data is in the CADU format that is based on XTE CADU layout (interleaving depth = 5). Only 1086 bytes of a CADU come straight from the bulk memory. The 4-byte sync mark, the 6-byte VCDU Primary Header, and the 6-byte VCDU Insert Zone will be inserted at playback by the MIC (for X-Band) or by the M-5 processor (for S-Band). The 2-byte Error Control CRC will be padded with zero by the MIC hardware during X-Band transmission or by the WARP software during S-Band transmission. During S-Band playbacks, the Communications RSN inserts valid data into this field. The last 160-byte long RS check symbols are inserted during playback by the S-Band Comm RSN (S-Band) or the MIC (X-Band).

3.1 Spacecraft Housekeeping Data Frames

The processor receives the spacecraft housekeeping data from C&DH. Only the 2-byte M_PDU header and the 1084-byte M_PDU packet data zone are retained and sent to the bulk memory. This data will be retrieved at playback.

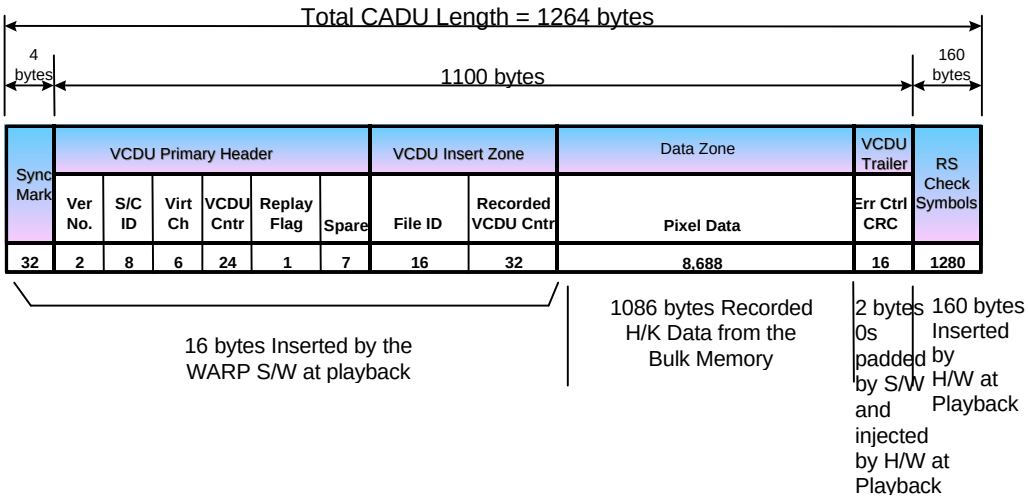
During S-Band playback, the WARP processor inserts the 4-byte sync mark, the 6-byte VCDU primary header, and 6-byte VCDU Insert Zone prior to S-Band output. The WARP processor also pads the 2-byte error control CRC field with zeros. The S-Band Comm RSN hardware inserts the error control CRC into the VCDU trailer and appends the 160-byte RS check symbols. The Recorded VCDU Counter in the VCDU Insert Zone indicates the record number within a particular file. The first record of each file has a VCDU counter value of one (1).

During X-Band playbacks, the MIC inserts the 4-byte sync mark, 6-byte VCDU primary header, and 6-byte VCDU Insert Zone and sends the CADU to the X-Band transponder. The Error Control CRC will contain 0's. The CADU is appended with 160-byte long RS check symbols at the end.



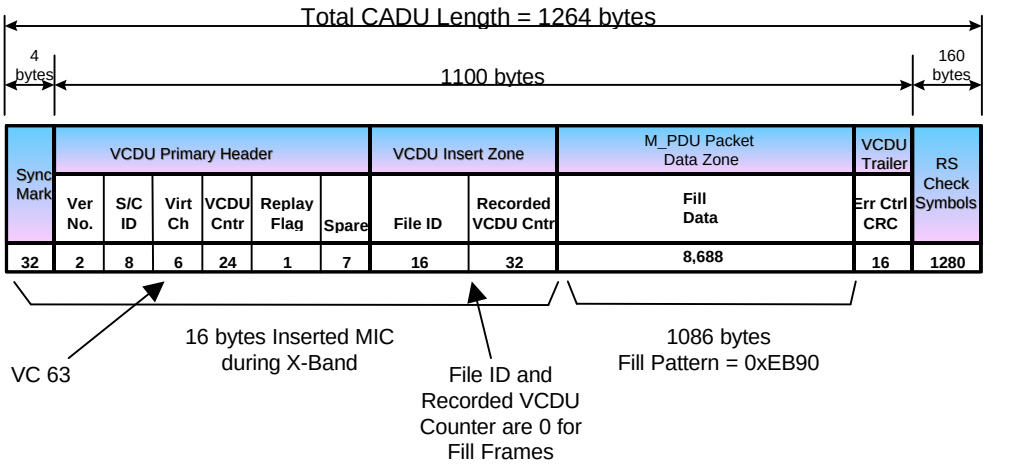
3.2 Raw Science Data Frames

The raw science data frame formats for S-Band and X-Band are identical. The common format is depicted below:



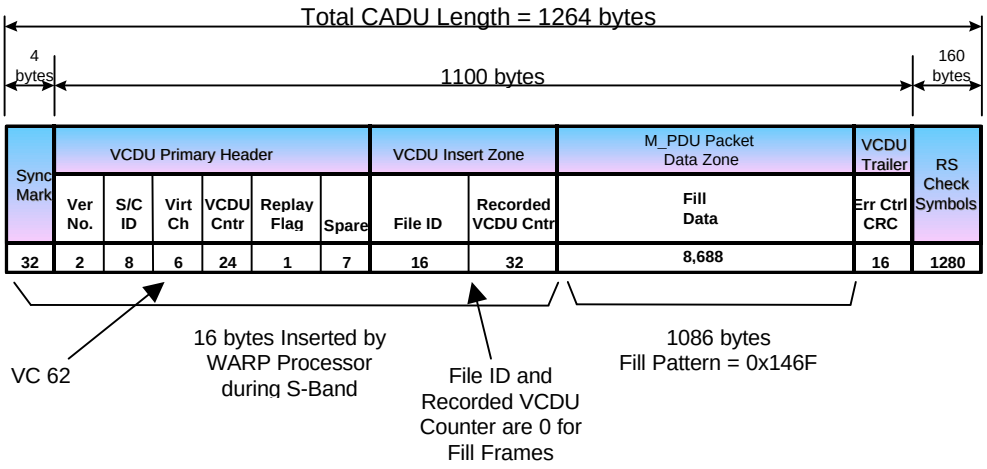
3.3 X-Band Fill Frames

During X-Band playback the WARP will output fill frames whenever data is not being played back. The X-Band fill frames will be sent on Virtual Channel 63. The fill frame data zone will be filled with the pattern 0xEB90. The file id will be 0 for fill frames. Note that the hardware increments the recorded VCDU counter automatically so it will not be 0.



3.4 S-Band Fill Frames

During S-Band playback if the WARP does not supply playback data the Communications RSN will automatically output fill frames. When the WARP does supply playback data it will be provided in blocks of 32 VCDU's. If the software does not have enough data to fill out 32 VCDU's the remaining VCDU's will be fill frames. Fill frames generated by the WARP will be sent on the alternate virtual channel 62. This is done to prevent VCDU counter fill frame sequence gaps. The WARP software has no way of synchronizing its fill frame sequence counter with the one output by the Communications RSN. The fill frame data zone will be filled with the pattern 0x146F. The file id and the recorded VCDU counter will be 0 for fill frames.



3.5 CADU Field Descriptions

The M_PDU Header and M_PDU Packet Data Zone fields are associated with CCSDS AOS packetized telemetry, and are not discussed in this section. Details of these fields can be found in the relevant C&DH software documentation or the CCSDS "Blue" Books.

3.5.1 Sync Mark

Item	Definition
1. Synchronization Marker	CADU sync for Transmission over space to ground communication link; it's value is "1ACFFC1D".

3.5.2 VCDU Primary Header

Item	Definition
1. Version #	It's value is binary "01" which is the value for an CCSDS AOS TLM Frame.
2. Spacecraft ID	It's value is decimal "393", Octal "611", or 189hex.
3. Virtual Channel ID	Value — Description 0-2 — Reserved for S/C C&DH transmitted Telemetry 3 — Scene S/C Housekeeping Data 4 — Unused 5 — Unused 6 — Raw Science Data - HSI SWIR 7 — Raw Science Data - HSI VNIR 8 — Raw Science Data - MS/PAN 9 — Raw Science Data - ACU
4. VC Data Unit Counter	Its value represents the # of the CADU frame and is continuous for each virtual channel. These counters are

	reset to (1) if the WARP processor experiences a “cold” restart
5. Replay Flag	It is usually 0, but will be set to 1 when a known discontinuity occurs in VCDU Counter.
6. Spare	This field is always zero.

3.5.3 Insert Zone

1. File ID	This is the 16-bit file ID of the file to which a recorded VCDU is apart.
2. Recorded VCDU Counter	This field is equivalent to a recorded record #.

3.5.4 Data Zone

3.5.5 Trailer

This field is for Error Control CRC, which will be Zero for X-Band and used by the S-Band Communications RSN.

3.5.6 RS Check Symbols

The 160-byte long RS check symbols are encoded by the MIC during X-Band playback and by the S-Band Transponder Comm RSN during S-Band playback.

4 PLAYBACK DATA FORMAT

4.1 Hyperion SWIR Data File

The Hyperion Science Data is stored as VNIR frames and SWIR frames. Each frame shall consist of a header followed by science data. The VNIR frame header shall consist of 4 32-bit words and the SWIR frame header shall consist of 5 32-bit words. The Frame Header includes the following fields:

- S/C Time Code = time broadcast by the S/C.

Spacecraft Time							
Seconds				Sub-Seconds			
TC 8	TC 7	TC 6	TC 5	TC 4	TC 3	TC 2	TC 1
Time Code Used In Header						Not Used	
32-bit				32-bit			

- Sync Time = time from S/C Tone to Hyperion frame sync in 32 µSec resolution.
- Frame Number = frame count from start command to stop command.
- Gains, Offsets, & Integration Time = ASPs settings.

Bit 0 Bit 31

SWIR Frame Header							
SWIR ID	TC 8				TC 7		TC 6
SWIR ID	TC 5				TC 4		TC 3
SWIR ID	INT Time				OSD		OSC
SWIR ID	GD	GC	GB	GA	OSB		OSA
SWIR ID	Sync Time				Frame Number		
8-bit	8-bit				8-bit		8-bit

Each 32-bit science data word shall consist of two 12-bit pixel data words (DB0:11 and DB16:27) and each with a 4-bit header (DB12:15) and (DB28:31). DB11 and DB27 shall be the LSBs of the 12-bit science data and DB0 and DB16 shall be the MSBs.

Bit 0 Bit 95

Science Image Data											
Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data
4-bit	12-bit	4-bit	12-bit	4-bit	12-bit	…					

MSB...LSB

.
.
.

SWIR Frame Header							
SWIR ID	TC 8				TC 7		TC 6
SWIR ID	TC 5				TC 4		TC 3
SWIR ID	INT Time				OSD		OSC
SWIR ID	GD	GC	GB	GA	OSB		OSA
SWIR ID	Sync Time				Frame Number		
8-bit	8-bit				8-bit		8-bit

Science Image Data											
Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data
4-bit	12-bit	4-bit	12-bit	4-bit	12-bit	…					

.
.

.

Bit N M-1

End of Science Data Fill Pattern
Till the end of the 1712-byte interleaved RS block = repeated 0xA55A

(possible range of length: 0 - 1709 bytes)

Bit M EOF

End of File Fill Pattern
Till end of the 929,616-byte logical block = repeated 0x13C7

(possible range of length: 0 - 927,904 bytes)

4.2 Hyperion VNIR Data File

The Hyperion Science Data is stored as VNIR frames and SWIR frames. Each frame shall consist of a header followed by science data. The VNIR frame header shall consist of 4 32-bit words and the SWIR frame header shall consist of 5 32-bit words. The Frame Header includes the following fields:

- S/C Time Code = time broadcast by the S/C.

Spacecraft Time							
Seconds				Sub-Seconds			
TC 8	TC 7	TC 6	TC 5	TC 4	TC 3	TC 2	TC 1
Time Code Used In Header						Not Used	

32-bit 32-bit

- Sync Time = time from S/C Tone to Hyperion frame sync in 32 µSec resolution.
- Frame Number = frame count from start command to stop command.
- Gains, Offsets, & Integration Time = ASPs settings.

Bit 0 Bit 31

VNIR Frame Header					
VNIR ID	TC 8	TC 7		TC 6	
VNIR ID	TC 5	TC 4		TC 3	
VNIR ID	XX	OSD	OSC	OSB	OSA
VNIR ID	Sync Time	Frame Number			

8-bit 8-bit 8-bit 8-bit

Bit 0 Bit 95

Science Image Data											
Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data

4-bit 12-bit 4-bit 12-bit 4-bit 12-bit …

MSB...LSB

.
.
.

VNIR Frame Header					
VNIR ID	TC 8	TC 7		TC 6	
VNIR ID	TC 5	TC 4		TC 3	
VNIR ID	XX	OSD	OSC	OSB	OSA
VNIR ID	Sync Time	Frame Number			

8-bit 8-bit 8-bit 8-bit

Science Image Data

Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data	Header	Pixel 2 Data	Header	Pixel 1 Data
4-bit	12-bit	4-bit	12-bit	4-bit	12-bit	…					

.
.
.

Bit N M-1

End of Science Data Fill Pattern
Till the end of the 1712-byte interleaved RS block = repeated 0xA55A

(possible range of length: 0 - 1709 bytes)

Bit M EOF

End of File Fill Pattern
Till end of the 929,616-byte logical block = repeated 0x13C7

(possible range of length: 0 - 927,904 bytes)

4.3 Multi-Spectral/Pan Band (MS/PAN) Data File

The scan line sync patterns are inserted at every MS scan line start. Therefore some PAN pixel data could appear before the first science data sync pattern if PAN pixels come to the WARP before the MS. Please refer the *EO-1 WARP RS-422 Terminal Board Mini Specification* for detail and latest revision. The data format of a played back MS/PAN file is summarized as follows:

Bit 0 Bit 95

Pixel Data								
Header 1	Pixel 1 Data	Pixel 2 Data	Header 2	Pixel 1 Data	Pixel 2 Data	Header 3	Pixel 1 Data	Pixel 2 Data
8-bit	12-bit	12-bit	8-bit	12-bit	12-bit	8-bit	12-bit	12-bit

MSB...LSB MSB...LSB

.
.
.

Bit K

Science Data Sync Pattern
80-bit fixed pattern + 16-bit counter + 32-bit's of 0's = 0xFF00FF00F0F0F0F0CCAA000000000000

128-bit

Bit K+128

Pixel Data											
Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data
8-bit	12-bit	12-bit	8-bit	12-bit	12-bit	…					

.
.
.

Science Data Sync Pattern
80-bit fixed pattern + 16-bit counter + 32-bit's of 0's = 0xFF00FF00F0F0F0F0CCAA000100000000

128-bit

Pixel Data											
Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data	Header	Pixel 1 Data	Pixel 2 Data
8-bit	12-bit	12-bit	8-bit	12-bit	12-bit	…					

.
.
.

Bit N M-1

End of Science Data Fill Pattern
Till the end of the 1712-byte interleaved RS block = repeated 0xA55A

(possible range of length: 0 - 1709 bytes)

Bit M EOF

End of File Fill Pattern
Till end of the 929,616-byte logical block = repeated 0x13C7

(possible range of length: 0 - 927,904 bytes)

4.4 Atmospheric Correction (AC) Data File

The detail of AC data format is yet unknown at this time. However, the playback file will have the End of Science Data Fill Pattern, and the End of File Fill Pattern, inserted at the beginning and at the end. The AC instrument will insert its own scanline sync among its 13-bit pixel data.

Bit 0

Science Data								
Pixel 1	Pixel 2	Pixel 3	Pixel 1	Pixel 2	Pixel 3	Pixel 1	Pixel 2	Pixel 3
16-bit	16-bit	16-bit						
MSB...LSB	MSB...LSB							

.
.
.

Bit N M-1

End of Science Data Fill Pattern
Till the end of the 1712-byte interleaved RS block = repeated 0xA55A

(possible range of length: 0 - 1709 bytes)

Bit M EOF

End of File Fill Pattern
Till end of the 929,616-byte logical block = repeated 0x13C7

(possible range of length: 0 - 927,904 bytes)

4.5 Spacecraft Housekeeping Data File

The following diagram summarizes the data file format of a Spacecraft Housekeeping Data File, without the 4-byte Sync Mark, 6-byte VCDU Primary Header, 2-byte Error Control CRC, and the 160-byte RS Check Symbol from the 1264-byte CADU frame. The Spacecraft Housekeeping Data file does NOT contain a file header block. In addition, when a Spacecraft Housekeeping Data File is played back at the X-Band, the repeated End of File Fill Pattern (0x13C7) will appear until the end of that logical block. *Please note that if the End of the last Spacecraft Housekeeping Transfer Frame ends right at the end of a logical block, this fill pattern will <u>NOT</u> show up.* For detail and latest revision on the content of the Spacecraft Housekeeping data file, please refer to the *EO-1 Command & Telemetry Handbook*.

Bit 0 48 64 8735

VCDU Insert Zone		M_PDU Header		M_PDU Packet Data Zone
File ID	Recorded VCDU Cntr	Spare	1st Hdr Pointer	Packet Data

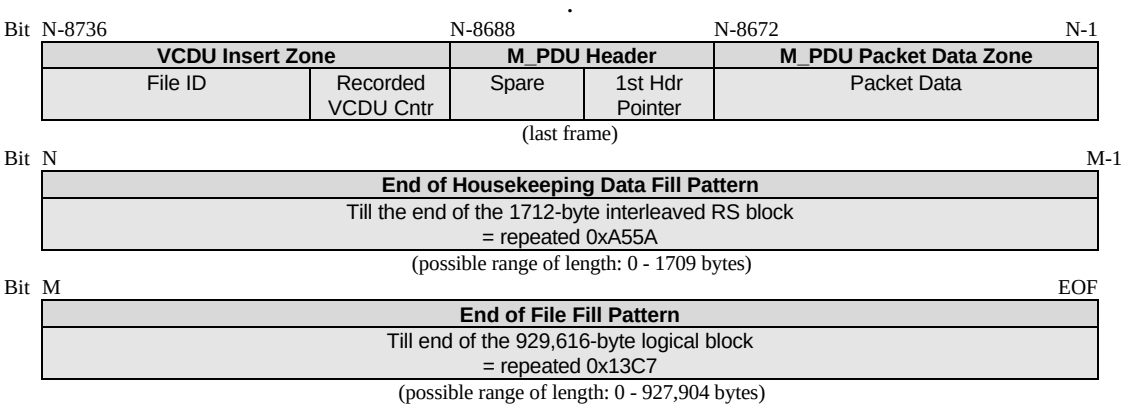
(first frame)

Bit 8736 8784 8800 17472

VCDU Insert Zone		M_PDU Header		M_PDU Packet Data Zone
File ID	Recorded VCDU Cntr	Spare	1st Hdr Pointer	Packet Data

(second frame)

.
.


Bit N-8736
N-8688
N-8672
N-1
VCDU Insert Zone
M_PDU Header
M_PDU Packet Data Zone
File ID
Recorded VCDU Cntr
Spare
1st Hdr Pointer
Packet Data
(last frame)
Bit N
M-1
End of Housekeeping Data Fill Pattern
Till the end of the 1712-byte interleaved RS block
= repeated 0xA55A
(possible range of length: 0 - 1709 bytes)
Bit M
EOF
End of File Fill Pattern
Till end of the 929,616-byte logical block
= repeated 0x13C7
(possible range of length: 0 - 927,904 bytes)

CCR SPONSOR RECOMMENDATION FORM

CCR NUMBER: 0023
CCR TITLE: B/L WARP TO GROUND ICD

CCR SPONSOR: Terry Smith/GSFC

SUMMARY OF COMMENTS RECEIVED: (list Level 4 CCB and internal reviewers who had comments and address those comments)

None.

Sponsor Recommendation: **Withdraw** CCR. It has been decided by EO- 1 Project Management that this document should **not** be treated as a stand alone document, instead, it should be incorporated into the Spacecraft to Ground ICD-23.

SPONSOR/ORGANIZATION: Terry Smith
DATE: 12/03/98